



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,799	08/19/2002	Weng-Hsing Huang	9222-US-PA	4097
31561	7590	06/17/2004	EXAMINER	
JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE 7 FLOOR-1, NO. 100 ROOSEVELT ROAD, SECTION 2 TAIPEI, 100 TAIWAN			HA, NATHAN W	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 06/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/064,799

Applicant(s)

HUANG ET AL.

Examiner

Nathan W. Ha

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 4/7/04.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Sogawa et al., US 5,670,402, previously cited.

Re claim 1, Sogawa et al. disclose in Figures 3 and 4, a memory device, comprising substrate (20); gate oxide layer (30), disposed on a surface of the substrate; conductive gate (32) disposed on a portion of the gate oxide layer; buried drain line (36), located in the substrate beside both sides of the gate; spacer (38) disposed on sidewalk of the gate; deep doped region (40) located in the substrate below a part of the buried drain line, wherein the buried drain line and the deep doped region together form a bit line of the memory device; an insulation layer (24), disposed on the gate oxide layer and above the bit line (e.g. column 6, lines 1-2); and a word line (28), disposed on the gate and the insulation layer, perpendicular to a direction of the bit line.

Re claim 2, in the memory device disclosed by Sogawa et al. the insulation layer is formed from silicon oxide (e.g. column 6, line 27).

Re claim 3, in the memory device disclosed by Sogawa et al. the spacer (38) is formed from silicon oxide (e.g. column 6, line 15).

Re claim 4, the memory device disclosed by Sogawa et al. the word line (28) is formed from polysilicon (e.g. column 6, line 55). Re claim 5, in the memory device disclosed by Sogawa et al. the deep-doped region (40) is located in the substrate beside both sides of the spacer.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 6-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu, 6,146,949 in view of Sogawa et al., US 5670,402, previously cited.

Re claim 6, Wu discloses a fabrication method for a memory device, comprising: forming a gate oxide layer (4) on a substrate (2); forming a bar-shaped conductive structure (6) on the gate oxide layer, wherein a cap layer (8) is formed on a top of the bar-shaped conductive structure; forming a buried drain line (14) in the substrate beside both sides of the bar-shaped conductive structure after forming the gate oxide layer and the bar-shaped conductive structure; forming a spacer (12) on sidewalls of the bar-shaped conductive structure and the cap layer after forming the buried drain line; and forming an insulation layer (16) above the bit line; removing the cap layer (e.g, Figure 7); forming a conductive layer on the substrate and patterning the conductive layer and the bar-shaped conductive structure in a direction perpendicular to a direction of the bit

line to form a word line (18) and a plurality of gates (e.g. column 4, lines 55-59). Wu does not disclose forming a deep doped region in the substrate beside both sides of the spacer, wherein the buried drain line and the deep doped region together form a bit line of the memory device. Sogawa et al. disclose a fabrication method for a memory device comprising forming a deep-doped region (40) in the substrate below a part of the buried drain line (36). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method disclosed by Wu to include the step of forming a deep doped region in the substrate below a part of the buried drain line as disclosed by Sogawa in order to increase reading speed of data (e.g. column 2, lines 15-18).

Re claim 7, in the modified method disclosed by Wu, there is an etching selectivity between the cap layer (8) and the spacer (12).

Re claim 8, in the modified method disclosed by Wu, there is an etching selectivity between the cap layer (8) and the insulation layer (16).

Re claim 9, in the modified method of Wu the cap layer is from silicon nitride (e.g. column 4, line 3).

Re claim 10, in the modified method of Wu, the spacer is formed from silicon oxide (e.g. column 4, line 22).

Re claim 11, in the modified method of Wu the insulation layer disclosed by Sogawa et al. is formed from silicon oxide (i.e. column 10, line 22).

Re claim 12, in the modified method of Wu, forming of the buried drain line (14) includes performing an ion implantation process using the cap layer and the bar-shaped conductive structure as an implantation mask (e.g. Figure 5).

Re claim 13, in the modified method of Wu, the deep-doped region (40) disclosed by Sogawa et al. is formed by performing an ion implantation process using the cap layer and the spacer as an implantation mask (e.g. Figure 4c).

Re claim 14, in the modified method of Wu forming of the insulation layer above the bit line comprises: forming globally an insulation material on the substrate, the insulation layer covers the cap layer; and removing a portion of the insulation material until the cap layer is exposed (e.g. column 4, lines 34-50).

Re claim 15, in the modified method of Wu, removing the portion of the insulation material includes performing back etching or chemical mechanical polishing (e.g. column 4, lines 34-50).

Re claim 16, in the modified method of Wu, forming of the bar-shaped conductive structure and the cap layer comprises: forming sequentially a conductive layer and a material (cap) layer on the gate oxide layer; and patterning the material layer and the conductive layer to form the bar-shaped conductive structure and the cap layer (e.g. Figures 2 and 3)

Re claim 17, in the modified method of Wu, forming the spacer comprises: forming a conformal silicon layer on the substrate and back-etching the conformal silicon oxide layer to form the spacer (e.g. column 4, lines 22-27).

Response to Arguments

5. Applicant's arguments filed 4/7/04 have been fully considered but they are not persuasive. For instance, Applicants submit that cited art, Sogawa, fails to disclose the gate structure as claimed in claim 1, for example, the spacer on the sidewalls of the gate and the word line on the gate. As mentioned above fig. 4c shows sidewalls 38 on the side of the gate 32. Furthermore, the combination of Sagawa and Wu indeed discloses word line 18 on the gate.

Applicants further contend that gate 32 is not conductive gate. It is noted that gate 32 is made of silicon nitride. It is conductive material either thermally or electrically.

Applicants further submit that Wu fails to disclose a deep-doped region in the substrate on the both sides of the spacers. This limitation can be found in Sogawa's fig.3, for example, region 40.

Conclusion

2. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 2814

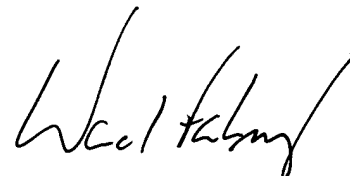
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan W. Ha whose telephone number is (571) 272-1707. The examiner can normally be reached on M-TH 8:00-7:00(EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Nathan Ha
June 11, 2004


SPE 2814